Drizzle in the Making

Research Highlight

Tiny water droplets called “drizzle” pack a powerful punch. They influence the structure of clouds and how long they last—two factors important to climate. To accurately depict this process in climate models, scientists need better information about the genesis of drizzle.

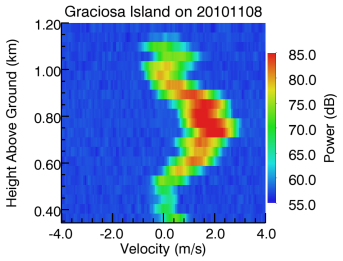
Scientists currently rely on airplanes to measure when drizzle starts within a cloud, but flights are expensive and measurements are limited in space. A less expensive and more comprehensive approach uses profiling cloud radars on the ground, augmented by other remote sensors, but the results are often difficult to interpret because they struggle to distinguish between the drizzle and the cloud that holds it.

A new technique recently reported in the *Journal of Atmospheric and Oceanic Technology* overcomes these measurement limitations by exploiting information contained within the spectrum of motions captured by cloud profiling radars. The approach uses this detailed information to distinguish between air motion, cloud, and drizzle.

To test the technique, researchers used the extensive data set collected during the deployment of the U.S. Department of Energy’s Atmospheric Radiation Measurement (ARM) Mobile Facility on Graciosa Island in the Azores from May 2009 through December 2010. The research team found that the method’s estimate of drizzle inside the cloud aligned very well with observed drizzle below the cloud, and that this held true whether the air was moving up or down.

“The technique has the potential to improve our understanding of the underlying properties of clouds and drizzle,” said Edward Luke from Brookhaven National Laboratory, who teamed with fellow researcher Pavlos Kollias from McGill University in Canada on the work. “The approach could also be applicable to studying other challenging meteorological conditions, such as mixed-phase clouds.”

The new ARM research facility in the Azores will generate a long-term data set to allow additional studies of this type.



This image shows droplet motion measured by a cloud profiling radar, with the output displayed as velocity spectral data. These details help identify the speed and size of droplets moving up and down within clouds.

Reference(s)

Luke EP and P Kollias. 2013. "Separating cloud and drizzle radar moments during precipitation onset using Doppler spectra." Journal of Atmospheric and Oceanic Technology, 30(8), http://dx.doi.org/10.1175/JTECH-D-11-00195.1.

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Cloud Life Cycle